# L2 / L3 Switches

# Link Aggregation

# Configuration Guide

**Revision 1.0**

The information in this USER'S MANUAL has been carefully reviewed and is believed to be accurate. The vendor assumes no responsibility for any inaccuracies that may be contained in this document, makes no commitment to update or to keep current the information in this manual, or to notify any person or organization of the updates. Please Note: For the most up-to-date version of this manual, please see our web site at www.supermicro.com.

Super Micro Computer, Inc. ("Supermicro") reserves the right to make changes to the product described in this manual at any time and without notice. This product, including software, if any, and documentation may not, in whole or in part, be copied, photocopied, reproduced, translated or reduced to any medium or machine without prior written consent.

IN NO EVENT WILL SUPERMICRO BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL, SPECULATIVE OR CONSEQUENTIAL DAMAGES ARISING FROM THE USE OR INABILITY TO USE THIS PRODUCT OR DOCUMENTATION, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. IN PARTICULAR, SUPERMICRO SHALL NOT HAVE LIABILITY FOR ANY HARDWARE, SOFTWARE, OR DATA STORED OR USED WITH THE PRODUCT, INCLUDING THE COSTS OF REPAIRING, REPLACING, INTEGRATING, INSTALLING OR RECOVERING SUCH HARDWARE, SOFTWARE, OR DATA.

Any disputes arising between manufacturer and customer shall be governed by the laws of Santa Clara County in the State of California, USA. The State of California, County of Santa Clara shall be the exclusive venue for the resolution of any such disputes. Super Micro's total liability for all claims will not exceed the price paid for the hardware product.

FCC Statement: This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the manufacturer's instruction manual, may cause harmful interference with radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case you will be required to correct the interference at your own expense.

California Best Management Practices Regulations for Perchlorate Materials: This Perchlorate warning applies only to products containing CR (Manganese Dioxide) Lithium coin cells. Perchlorate Material-special handling may apply. See http://www.dtsc.ca.gov/hazardouswaste/perchlorate/ for further details.

Manual Revision 1.0

Release Date: January 25, 2013

Unless you request and receive written permission from Super Micro Computer, Inc., you may not copy any part of this document.

Information in this document is subject to change without notice. Other products and companies referred to herein are trademarks or registered trademarks of their respective companies or mark holders.

Copyright © 2013 by Super Micro Computer, Inc.
All rights reserved.
Printed in the United States of America

# Contents

1 Link Aggregation Configuration Guide ..... 4
1.1 Link Aggregation Basics ..... 4
1.2 Link Aggregation Support ..... 5
1.3 Link Aggregation Numbers ..... 6
1.4 Link Aggregation Defaults ..... 6
1.5 Static Link Aggregation ..... 6
1.6 Dynamic Link Aggregation - LACP ..... 6
1.7 Creating Port Channels ..... 8
1.7.1 Creating Port Channel Interfaces ..... 8
1.7.2 Adding Member Ports to Port Channels ..... 9
1.8 Modifying Port Channels ..... 11
1.8.1 Modifying Port Channel Parameters ..... 11
1.8.2 Modifying Port Channel Member Ports ..... 11
1.9 Removing Port Channels ..... 14
1.10 LACP Parameters ..... 15
1.10.1 LACP System Priority ..... 16
1.10.2 LACP Port Priority ..... 16
1.10.3 LACP Timeout ..... 18
1.10.4 LACP Wait Time ..... 19
1.11 Load Balancing ..... 20
1.12 Disabling Link Aggregation Feature ..... 22
1.13 Link Aggregation Configuration Example ..... 23

# 1 Link Aggregation Configuration Guide

This document describes the Link Aggregation feature supported in Supermicro Layer 2 / Layer 3 switch products.

This document covers the Link Aggregation configurations for the below listed Supermicro switch Products.

| Top of Rack Switches | Blade Switches |
|---|---|
| • SSE-G24-TG4 | • SBM-GEM-X2C |
| • SSE-G48-TG4 | • SBM-GEM-X2C+ |
| • SSE-X24S | • SBM-GEM-X3S+ |
| • SSE-X3348S | • SBM-XEM-X10SM |
| • SSE-X3348T | |

The majority of this document applies to the above listed Supermicro switch products. In any particular sub section however, the contents might vary across these switch product models. In those sections the differences are clearly identified with reference to particular switch product models. If any particular switch product model is not referenced, the reader can safely assume that the content is applicable to all the above listed models.

Throughout this document, the common term “switch” refers to any of the above listed Supermicro switch product models unless a particular switch product model is noted.

## 1.1 Link Aggregation Basics

The Link Aggregation feature when helps connecting two or more physical links between two network devices without forming loops. Link Aggregation can be used between switches, servers and routers.

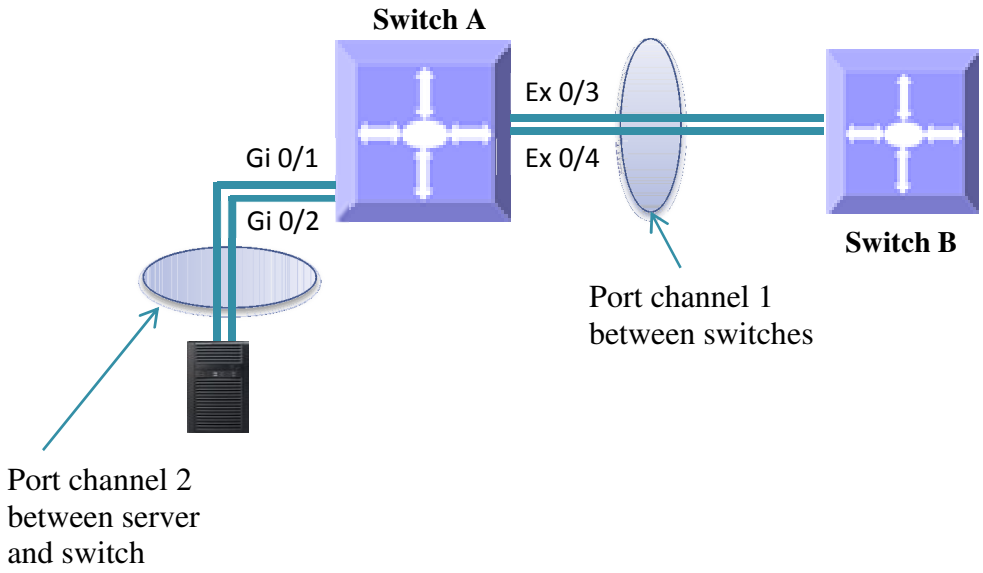
Link Aggregation provides the following advantages:

⇒ Increased bandwidth – User can connect up to eight physical links between devices to increase the link bandwidth. When 1 Gbps links are aggregated, users can get an aggregated link with up to 8 Gbps bandwidth . In 10Gig switches, user can aggregate eight 10Gig ports to get up to 80 Gbps speed aggregated uplink.

⇒ Incremental bandwidth – Users can start aggregation with a fewer number of ports and then increase the number of ports in aggregation (up to eight) incrementally based on the bandwidth requirements.

⇒ Redundancy - When one of the physical links fails, traffic will be distributed over the other remaining links in the aggregation.

**Figure LA-1: Link Aggregation**




The terms “port channel”, “channel group” and “ether channels” are used synonymously to refer to aggregated links.

# 1.2 Link Aggregation Support

Supermicro switches support both static and dynamic link aggregations. Dynamic link aggregation support is based on the Link Aggregation Control Protocol (LACP).

Supermicro switches support only Layer 2 level link aggregation. Hence, only switching ports can be aggregated. Layer 3 interfaces cannot be aggregated in Supermicro switches.

Supermicro switches do not support the Multiple Chassis Link Aggregation (MLAG) feature.

# 1.3 Link Aggregation Numbers

Supermicro switches support up to 24 port channels.

Each port channel can have eight active links.

Users can configure more than eight ports to a LACP mode port channel. However, a maximum of eight ports only can be in an active bundle state in any port channel.

# 1.4 Link Aggregation Defaults

The Link Aggregation feature is enabled by default in Supermicro switches.

When a port channel interface is created, it will be added to VLAN 1 by default.

Port channels use the MAC address of the first physical link added to it.

The default LACP system priority is 32768.

The default LACP port priority is 128.

The default LACP timeout is long (30 seconds).

The default LACP wait time is 2 seconds.

# 1.5 Static Link Aggregation

Supermicro switches support static link aggregation.

User can add up to eight ports to a static port channel group. When the physical link status of one or more ports in a channel group is up, that port channel status will be up. The port channel status will be down when the ports physical link status of all members are down.

Switches do not exchange any port channel control information with other end devices in static link aggregation. Hence, users need to configure the port channel groups and member ports correctly on both end devices.

# 1.6 Dynamic Link Aggregation - LACP

Supermicro switches support dynamic link aggregation through IEEE 802.3ad Link Aggregation Control Protocol (LACP).

Users can add one or more ports to an LACP mode port channel. When more than eight member ports are configured, only the first eight member ports reaching “bundle” state will be used for data traffic.

Ports in LACP mode exchange LACP packets with other end device. The LACP system priority, switch MAC address, port LACP priority, port number and aggregation key are all exchanged between devices. Based on the exchanged information, both end devices agree on the status of the member ports. The member ports that successfully negotiated LACP parameters will be moved to the “bundle” state. The member ports that could not reach agreement on LACP parameters will stay in the “independent” state. Switches do not send traffic on member ports in “independent” state.

When one or more member ports reach the “bundle” state, the port channel status will be up. The port channel status will be down when all its member ports are either physically down or in the “ndependent” state.

Ports can be configured in either active or passive LACP mode. Ports in active LACP mode will initiate LACP negotiation by sending LACP messages to the other end devices. Ports in passive LACP mode will not initiate the LACP negotiation, but they will respond to LACP messages if received from other end devices.

Users should configure for an active LACP mode on at least one end of the LACP port channel connection. If LACP mode is configured as passive on both end devices, the port channel interface will not come up. Configuring LACP mode as active on both the end devices is allowed.

**Figure LA-2: Dynamic Link Aggregation**

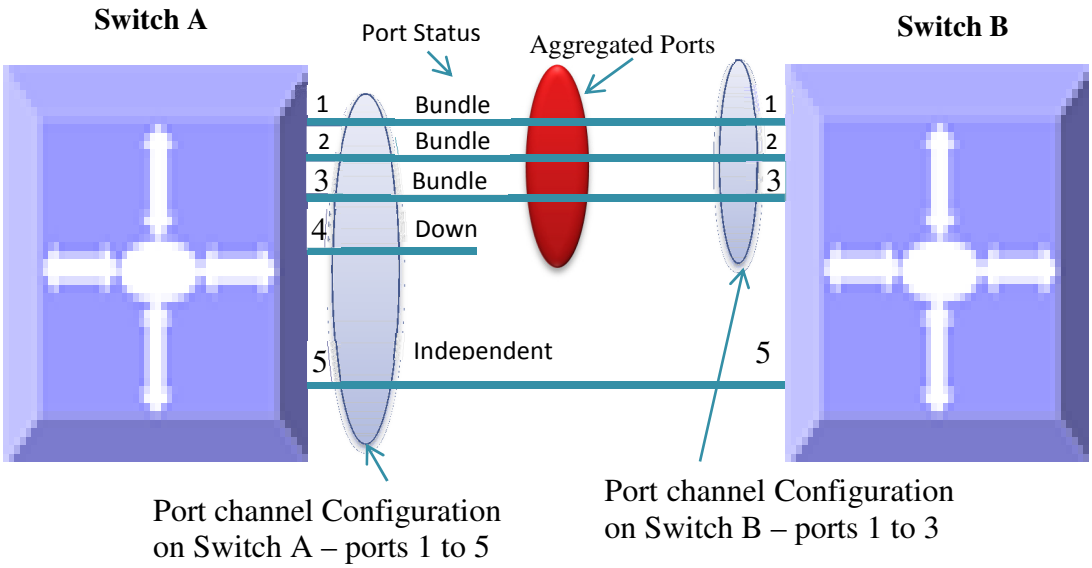


Figure LA-2: Dynamic Link Aggregation shows an example of a port channel configuration with port status and aggregated ports. In this example, port 5 is not configured on LACP mode on switch B, and is therefore shown as being in the "independent" state and not part of the aggregated ports.

# 1.7 Creating Port Channels

Port channel creation involves two steps: the first step is creating the port channel interfaces and the second step is adding member ports to the port channel interfaces.

## 1.7.1 Creating Port Channel Interfaces

Follow the steps below to create port channel interfaces in Supermicro switches.

| Step | Command | Description |
|---|---|---|
| Step 1 | **configure terminal** | Enters the configuration mode |
| Step 2 | **interface port-channel <***channel-group-number***>**<br>or<br>**no interface range port-channel <***channel-group-number***> ….** | Creates a port channel using "**interface port—channel"** command.<br><br>*channel-group-number* – may be any number from 1 to 65535.<br><br>To configure multiple port channel interfaces, use the "**interface range** …" command. To provide a range, use a hyphen (-) between the start and end interface numbers.<br>E.g.: **int range po 1-3**<br>To provide multiple interfaces or ranges, separate with a comma (,).<br>E.g. : **int range po 1, 2** |
| Step 3 | **description <***string***>** | Optional step - adds any name string to the port channel interfaces using the **description** command.<br><br>The *string* may be up to 64 characters in length.<br><br>The port channel description strings will not affect the member ports description strings configurations. |
| Step 4 | **mtu <***framesize***>** | Optional step.<br><br>Configures the MTU for the port channel interfaces.<br><br>*framesize* may be any number from 1500 to 9216. The default value is 1500. |

| | | |
|---|---|---|
| | | Port channel MTU will be used on its all member ports. |
| Step 5 | VLAN Configurations | Optional step – configures the VLAN parameters for port channel interfaces.<br><br>Refer to the VLAN configuration guide for all VLAN configuration details. |
| Step 6 | Spanning Tree Configurations | Optional step – configures the spanning tree parameters for port channel interfaces.<br><br>Refer to the spanning tree configuration guide for all spanning tree configuration details. |
| Step 7 | **end** | Exits the configuration mode. |
| Step 8 | **show interface port-channel** *<channel-group-number>*<br><br>**show etherchannel [[***channel-group-number***] { detail \| load-balance \| port \| por t-channel \| summary \| protocol}]** | Displays the configured port channel information. |
| Step 9 | **write startup-config** | Optional step – saves this port channel configuration to be part of startup configuration. |

## 1.7.2 Adding Member Ports to Port Channels

Users can add up to eight member ports to static port channels. For LACP port channels, user can add more than eight ports, but only the first eight member ports reaching a bundle state will be part of the port channel for data transfer.

Only ports of same speed can be added to port channel interfaces.

Follow the steps below to add member ports to port channel interfaces.

| Step | Command | Description |
|---|---|---|
| Step 1 | **configure terminal** | Enters the configuration mode |
| Step 2 | **interface** *<interface-type> <interface-id>*<br>or<br>**interface range** *<interface-type> <interface-id>*<br>…. | Enters the interface mode.<br><br>*interface-type* – may be any of the following:<br>gigabitethernet – gi<br>extreme-ethernet – ex |

| | | |
|---|---|---|
| | | qx-ethernet – qx<br><br>*interface-id* is in *slot/port* format for all physical interfaces.<br><br>To configure multiple interfaces, use the "**interface range** …" command. To provide a range, use a hyphen (-) between the start and end interface numbers.<br>E.g.: **int range gi 0/1-10**<br>To provide multiple interfaces or ranges, separate with a comma (,).<br>E.g.: **int range gi 0/1-10, gi 0/20** |
| Step 3 | **channel-group** <channel-group-number> **mode** {**active** \| **passive** \| **on**} | Configures the interfaces as member ports for the given port channel.<br><br>*channel-group-number* – The port channel to which these member ports are added.<br><br>For LACP aggregation, use the **active** or **passive** mode.<br>For static link aggregation, use mode **on**. |
| Step 4 | **end** | Exits the interface configuration mode. |
| Step 5 | **show interface port-channel** *<channel-group-number>*<br><br>**show etherchannel [[***channel-group-number***] { detail \| load-balance \| port \| por t-channel \| summary \| protocol}]** | Displays the configured port channel information. |
| Step 6 | **write startup-config** | Optional step – saves this port channel configuration to be part of startup configuration. |

The MTU, VLAN and spanning tree parameters of a port channel interface will be used on its member ports. After adding a port to any port channel, users should not configure MTU, VLAN and spanning tree parameters on that port. Instead users should configure MTU, VLAN and spanning tree parameters on the port channel interfaces.

The examples below show various ways to create port channels.

**Create an LACP port channel with member ports ex 0/1 and ex 0/2.**

SMIS# **configure terminal**
SMIS(config)# **interface port-channel 10**
SMIS(config-if)# **exit**
SMIS(config)# **int range ex 0/1-2**
SMIS(config-if)# **channel-group 10 mode active**
SMIS(config-if)# **end**

**Create a static port channel having MTU 9000 with member ports ex 0/1 and ex 0/2. Also configure this port channel as a trunk interface to carry all the VLANs configured in the switch.**

SMIS# **configure terminal**
SMIS(config)# **interface port-channel 10**
SMIS(config-if)# **mtu 9000**
SMIS(config-if)# **switchport mode trunk**
SMIS(config-if)# **exit**
SMIS(config)# **int range ex 0/1-2**
SMIS(config-if)# **channel-group 10 mode on**
SMIS(config-if)# **end**

# 1.8 Modifying Port Channels

## 1.8.1 Modifying Port Channel Parameters

After a port channel is created, users can modify the port channel configuration for description, MTU, VLAN, and spanning tree parameters. Users should not modify these parameters on port channel member ports directly. Instead, these parameters should be configured on port channel interfaces.

To modify port channel parameters, follow the same steps used to create the port channels as explained in the Creating Port Channel Interfaces section.

The example below shows the steps to modify the parameters of a port channel interface.

**Modify port channel 10 as a trunk interface to allow VLANs 100 to 200 with a native VLAN 100.**

SMIS# **configure terminal**
SMIS(config)# **interface port-channel 10**
SMIS(config-if)# **switchport mode trunk**
SMIS(config-if)# **switchport trunk allowed vlan 100-200**
SMIS(config-if)# **switchport trunk native vlan 100**
SMIS(config-if)# **exit**

## 1.8.2 Modifying Port Channel Member Ports

Users can add or remove member ports to the existing port channels. Users can also modify the port modes for member ports.

### 1.8.2.1 Adding New Member Ports

To add new member ports to an existing port channel, follow the same steps explained in the Adding Member Ports to Port Channels section.

The example below shows the steps necessary to add a new member port to an existing port channel interface.

**Add port ex 0/3 to static port channel interface 10.**

SMIS# **configure terminal**
SMIS(config)# **int ex 0/3**
SMIS(config-if)# **channel-group 10 mode on**
SMIS(config-if)# **exit**

### 1.8.2.2 Removing Member Ports

Follow the steps below to remove member ports from the port channel interfaces.

| Step | Command | Description |
|---|---|---|
| Step 1 | **configure terminal** | Enters the configuration mode |
| Step 2 | **interface** <*interface-type*> <*interface-id*><br>or<br>**interface range** <*interface-type*> <*interface-id*><br>…. | Enters the interface mode.<br><br>*interface-type* – may be any of the following:<br>gigabitethernet – gi<br>extreme-ethernet – ex<br>qx-ethernet – qx<br><br>*interface-id* is in *slot/port* format for all physical interfaces.<br><br>To configure multiple interfaces, use the "**interface range** …" command. To provide a range, use a hyphen (-) between the start and end interface numbers.<br>E.g.: **int range gi 0/1-10**<br>To provide multiple interfaces or ranges, separate with a comma (,).<br>E.g.: **int range gi 0/1-10, gi 0/20** |
| Step 3 | **no channel-group** | Removes the member ports from the port channel. |
| Step 4 | **end** | Exits the configuration mode. |
| Step 5 | **show interface port-channel** <*channel-group-number*><br><br>**show etherchannel [[***channel-group-number***] {** | Displays the configured port channel information. |

| | | |
|---|---|---|
| | **detail \| load-balance \| port \| por t-channel \| summary \| protocol}]** | |
| Step 6 | **write startup-config** | Optional step – saves this port channel configuration to be part of startup configuration. |

When a port is removed from a port channel, that port will be added to VLAN 1 automatically. The MTU and spanning tree configurations of that port will not be changed to the default configurations automatically.

After removing any port from a port channel, users must verify and change the port VLAN, MTU and spanning tree configurations as needed.

The example below shows the steps necessary to remove a member port from a port channel interface.

**Remove port ex 0/3 from port channel interface 10.**

SMIS# **configure terminal**
SMIS(config)# **int ex 0/3**
SMIS(config-if)# **no channel-group**
SMIS(config-if)# **exit**

### *1.8.2.3 Modifying Member Ports Mode*

To modify the port channel mode (active / passive / on) for any member port, users should first remove the port from the port channel using the "no channel-group" command. After removing the port from the port channel interface, the channel-group command can be configuredwith the required port mode.

Follow the steps below to change member ports mode.

| Step | Command | Description |
|---|---|---|
| Step 1 | **configure terminal** | Enters the configuration mode |
| Step 2 | **interface** <*interface-type*> <*interface-id*><br>or<br>**interface range** <*interface-type*> <*interface-id*><br>…. | Enters the interface mode.<br><br>*interface-type* – may be any of the following:<br>gigabitethernet – gi<br>extreme-ethernet – ex<br>qx-ethernet – qx<br><br>*interface-id* is in *slot/port* format for all physical interfaces.<br><br>To configure multiple interfaces, use the "**interface range** …" command. To |

| | | |
|---|---|---|
| | | provide a range, use a hyphen (-) between the start and end interface numbers.<br>E.g.: **int range gi 0/1-10**<br>To provide multiple interfaces or ranges, separate with a comma (,).<br>E.g.: **int range gi 0/1-10, gi 0/20** |
| Step 3 | **no channel-group** | Removes the member ports from the port channel. |
| Step 4 | **channel-group** <channel-group-number> **mode** {**active** \| **passive** \| **on**} | Configures the interfaces as member ports with the given port mode.<br><br>For LACP aggregation, use the **active** or **passive** mode.<br><br>For static link aggregation, use the mode **on**.<br><br>*channel-group-number* – The port channel to which these member ports are added. |
| Step 5 | **end** | Exits the interface configuration mode. |
| Step 6 | **show interface port-channel** *<channel-group-number>*<br><br>**show etherchannel [[***channel-group-number***] { detail \| load-balance \| port \| por t-channel \| summary \| protocol}]** | Displays the configured port channel information. |
| Step 7 | **write startup-config** | Optional step – saves this port channel configuration to be part of startup configuration. |

The example below shows the steps necessary to modify the member ports modes of a port channel interface.

**Modify the member ports modes to active for ports ex 0/2 and ex 0/3.**

SMIS# **configure terminal**
SMIS(config)# **int range ex 0/2-3**
SMIS(config-if)# **no channel-group**
SMIS(config-if)# **channel-group 10 mode active**
SMIS(config-if)# **exit**

# 1.9 Removing Port Channels

Follow the steps below to remove the port channel interfaces.

| Step | Command | Description |
|---|---|---|
| Step 1 | **configure terminal** | Enters the configuration mode |
| Step 2 | **no interface port-channel** <*channel-group-number*><br>or<br><br>**no interface range port-channel** <*channel-group-number*> …. | Removes the port channel interface.<br><br>*channel-group-number* – may be any number from 1 to 65535.<br><br>To remove multiple port channel interfaces, use the "**no interface range** …" command. To provide a range, use a hyphen (-) between the start and end interface numbers.<br>E.g.: **no int range po 1-3**<br>To provide multiple interfaces or ranges, separate with a comma (,).<br>E.g. : **no int range po 1, 2** |
| Step 3 | **show running-config**<br><br>**show etherchannel** | Displays the port channel information. |
| Step 4 | **write startup-config** | Optional step – saves this port channel configuration to be part of startup configuration. |

When a port channel is removed, all its member ports will be added to VLAN 1 automatically. The MTU and spanning tree configurations of that port will not automatically be changed to default configurations.

The example below shows the necessary steps to remove a port channel interface.

**Remove the port channel 10 and add all its member ports to VLAN 10 as access ports.**

SMIS# **configure terminal**
SMIS(config)# **no int port-channel 10**
SMIS(config)# **interface range ex 0/1-2**
SMIS(config-if)# **switchport mode access**
SMIS(config-if)# **switchport access vlan 10**
SMIS(config-if)# **exit**

## 1.10 LACP Parameters

Users can configure the following LACP parameters on Supermicro switches.

- LACP System Priority
- LACP Port Priority
- LACP Timeout

- LACP Wait Time

### 1.10.1 LACP System Priority

Every LACP device needs to have a globally unique system identifier. This globally unique system identifier is formed by combining a switch's MAC address and LACP system priority.

LACP system priority is also used to decide the active member ports of a port channel. When more than eight member ports are configured, the switch that has low system priority value decides the active member ports. If both end devices have the same LACP system priority, the device with the numerically lower MAC address will get to decide the active member ports.

The default LACP system priority value is 32768.

Follow the steps below to modify the LACP system priority.

| Step | Command | Description |
|---|---|---|
| Step 1 | **configure terminal** | Enters the configuration mode. |
| Step 2 | **lacp system-priority** <*system-priority*> | Configures the LACP system priority.<br><br>*system-priority* – may be any value from 0 to 65535 |
| Step 3 | **exit** | Exits the configuration mode. |
| Step 4 | **show running-config** | Displays the configured LACP system priority value. |
| Step 5 | **write startup-config** | Optional step – saves this LACP configuration to be part of startup configuration. |

The "**no lacp system-priority**" command resets the LACP system priority to the default value 32768.

The example below shows the steps necessary to configure the LACP system priority value.

**Set the LACP system priority as 1000.**

SMIS# **configure terminal**
SMIS(config)# **lacp system-priority 1000**
SMIS(config-if)# **exit**

### 1.10.2 LACP Port Priority

When more than eight member ports are configured, the ports that have the lowest port priority value get selected as active member ports. If multiple ports have the same port priority value, the ports with the numerically lower port numbers will be selected as the active member ports.

The default LACP port priority is 128.

Follow the steps below to modify the LACP port priority.

| Step | Command | Description |
|---|---|---|
| Step 1 | **configure terminal** | Enters the configuration mode. |
| Step 2 | **interface** <*interface-type*> <*interface-id*><br>or<br>**interface range** <*interface-type*> <*interface-id*><br>…. | Enters the interface mode.<br><br>*interface-type* – may be any of the following:<br>gigabitethernet – gi<br>extreme-ethernet – ex<br>qx-ethernet – qx<br><br>*interface-id* is in *slot/port* format for all physical interfaces.<br><br>To configure multiple interfaces, use the "**interface range** …" command. To provide a range, use a hyphen (-) between the start and end interface numbers.<br>E.g.: **int range gi 0/1-10**<br>To provide multiple interfaces or ranges, separate with a comma (,).<br>E.g.: **int range gi 0/1-10, gi 0/20** |
| Step 3 | **lacp port-priority** <*port-priority*> | Configures the LACP port priority.<br><br>*port-priority* – may be any value from 0 to 65535 |
| Step 4 | **end** | Exits the configuration mode. |
| Step 5 | **show running-config**<br><br>**show etherchannel** | Displays the configured port priority information. |
| Step 6 | **write startup-config** | Optional step – saves this port priority configuration to be part of startup configuration. |

The "**no lacp port-priority**" command resets the LACP port priority to the default value of 128.

The example below shows the steps necessary to configure the port priority.

**Configure the port priority as 10 for ex 0/1 and 20 for ex 0/2.**

SMIS# **configure terminal**
SMIS(config)# **interface ex 0/1**
SMIS(config-if)# **lacp port-priority 10**
SMIS(config-if)# **exit**
SMIS(config)# **interface ex 0/2**
SMIS(config-if)# **lacp port-priority 20**
SMIS(config-if)# **exit**

### 1.10.3 LACP Timeout

Every LACP member port sends LACP messages periodically. The time period between LACP messages is configurable using the "**lacp timeout**" command.

Users can define the LACP timeout value either as "**long**" or "**short**". Every member port can have different LACP timeout selections. Also, the LACP timeout selection does not need to match on both end devices. An LACP port with a "**long**" timeout can be connected to a port which has a "**short**" timeout. When the "**long**" timeout value is chosen, LACP messages are expected to be received once every 30 seconds. When the "**short**" timeout value is chosen, LACP messages are expected to be received once every second.

The default LACP timeout is "**long**".

Follow the steps below to modify the LACP timeout value.

| Step | Command | Description |
|---|---|---|
| Step 1 | **configure terminal** | Enters the configuration mode. |
| Step 2 | **interface** <*interface-type*> <*interface-id*><br>or<br>**interface range** <*interface-type*> <*interface-id*><br>…. | Enters the interface mode.<br><br>*interface-type* – may be any of the following:<br>gigabitethernet – gi<br>extreme-ethernet – ex<br>qx-ethernet – qx<br><br>*interface-id* is in *slot/port* format for all physical interfaces.<br><br>To configure multiple interfaces, use the "**interface range** …" command. To provide a range, use a hyphen (-) between the start and end interface numbers.<br>E.g.: **int range gi 0/1-10**<br>To provide multiple interfaces or ranges, separate with a comma (,).<br>E.g.: **int range gi 0/1-10, gi 0/20** |
| Step 3 | **lacp timeout {long \| short}** | Configures the LACP port timeout. |

| | | |
|---|---|---|
| | | **long** – LACP messages are expected to be received once every 30 seconds.<br>**short** – LACP messages are expected to be received once every second. |
| Step 4 | **end** | Exits the configuration mode. |
| Step 5 | **show running-config**<br><br>**show etherchannel** | Displays the configured port priority information. |
| Step 6 | **write startup-config** | Optional step – saves this port timeout configuration to be part of startup configuration. |

The "**no lacp timeout**" command resets the LACP timeout to the default value of "**long**".

The example below shows the steps necessary to configure the LACP timeout.

**Configure the LACP timeout as short for ports ex 0/1 and ex 0/2.**

SMIS# **configure terminal**
SMIS(config)# **interface range ex 0/1-2**
SMIS(config-if)# **lacp timeout short**
SMIS(config-if)# **exit**

### 1.10.4 LACP Wait Time

Switch waits for "LACP wait time" period before adding any member port in to aggregation.

The default LACP wait time period is two seconds.

Users can choose any time interval from 0 to 10 seconds as the LACP wait time. The LACP wait time is port specific and users can configure different LACP wait times on different member ports.

Follow the steps below to modify the LACP wait time.

| Step | Command | Description |
|---|---|---|
| Step 1 | **configure terminal** | Enters the configuration mode. |
| Step 2 | **interface** <*interface-type*> <*interface-id*><br>or<br>**interface range** <*interface-type*> <*interface-id*><br>…. | Enters the interface mode.<br><br>*interface-type* – may be any of the following:<br>gigabitethernet – gi<br>extreme-ethernet – ex<br>qx-ethernet – qx |

| | | |
|---|---|---|
| | | *interface-id* is in *slot/port* format for all physical interfaces.<br><br>To configure multiple interfaces, use the "**interface range** …" command. To provide a range, use a hyphen (-) between the start and end interface numbers.<br>E.g.: **int range gi 0/1-10**<br>To provide multiple interfaces or ranges, separate with a comma (,).<br>E.g.: **int range gi 0/1-10, gi 0/20** |
| Step 3 | **lacp wait-time {***timeout***}** | Configures the LACP port wait time.<br><br>*timeout* – may be any value from 0 to 10 seconds. |
| Step 4 | **End** | Exits the configuration mode. |
| Step 5 | **show running-config**<br><br>**show etherchannel** | Displays the configured port priority information. |
| Step 6 | **write startup-config** | Optional step – saves this LACP wait time configuration to be part of startup configuration. |

The "**no lacp wait-time**" command resets the LACP wait time to the default value of "**2**".

The example below shows the necessary steps to configure the LACP wait time.

**Configure the LACP wait time as 0 for ports ex 0/1 and ex 0/2.**

SMIS# **configure terminal**
SMIS(config)# **interface range ex 0/1-2**
SMIS(config-if)# **lacp wait-time 0**
SMIS(config-if)# **exit**

# 1.11 Load Balancing

Supermicro switches support load balancing on aggregated links.

Switches distribute outgoing traffic on all member ports that are in bundle state. The distribution decision to transmit a packet on any particular member port is decided by a hash algorithm. Supermicro switches support the following hash algorithms:

**Source MAC Based**

- Packets will be distributed across the member ports based on the source MAC address of the packet.

**Destination MAC Based**

- Packets will be distributed across the member ports based on the destination MAC address of the packet.

**Source and Destination MAC Based**

- Packets will be distributed across the member ports based on the source and destination MAC addresses of the packet.

**Source IP Based**

- Packets will be distributed across the member ports based on the source IP address of the packet.

**Destination IP Based**

- Packets will be distributed across the member ports based on the destination IP address of the packet.

**Source and Destination IP Based**

- Packets will be distributed across the member ports based on the source and destination IP addresses of the packet.

The hash algorithm provides the best distribution when the traffic has multiple streams. Users need to choose the right hash algorithm based on their common traffic scenarios.

The load balance algorithm selection can be configured for individual port channel interfaces or it can be configured globally for all port channel interfaces. The load balancing algorithm on both ends of a port channel need not be the same.

The default load balancing algorithm is “Source and Destination MAC Based”.

Follow the below steps to configure the load balancing algorithm.

| Step | Command | Description |
|---|---|---|
| Step 1 | **configure terminal** | Enters the configuration mode. |
| Step 2 | **port-channel load-balance {src-mac \| dest-mac \| src-dest-mac\| src-ip \| dest-ip \| src-dest-ip} [** <*channel-group*> **]** | *channel-group* is the port channel identifier to which this load balancing algorithm is configured. *channel-group* number is an optional parameter for this configuration. When *channel-group* is not provided, the given port channel algorithm will be applied to all port channel interfaces. |
| Step 3 | **end** | Exits the configuration mode. |
| Step 4 | **show running-config** | Displays the configured load balancing information. |

| | | |
|---|---|---|
| Step 5 | **write startup-config** | Optional step – saves this load balancing configuration to be part of startup configuration. |

The "**no port-channel load-balance**" command resets the load balancing algorithm to the default value of "**src-dest-mac**".

The example below shows the steps necessary to configure the port channel load balancing algorithm.

**Configure the load balancing algorithm based upon source and destination IP addresses.**

SMIS# **configure terminal**
SMIS(config)# **port-channel load-balance src-dest-ip**
SMIS(config-if)# **exit**

## 1.12 Disabling the Link Aggregation Feature

The link aggregation feature is enabled by default in Supermicro switches. Users can disable link aggregation if needed.

Follow the steps below to disable the link aggregation feature.

| Step | Command | Description |
|---|---|---|
| Step 1 | **configure terminal** | Enters the configuration mode. |
| Step 2 | **set port-channel disable** | Disables the link aggregation feature. |
| Step 3 | **end** | Exits the configuration mode. |
| Step 4 | **show etherchannel** | Displays link aggregation feature status. |
| Step 5 | **write startup-config** | Optional step – saves this configuration to be part of startup configuration. |

To enable the link aggregation feature, follow the steps below.

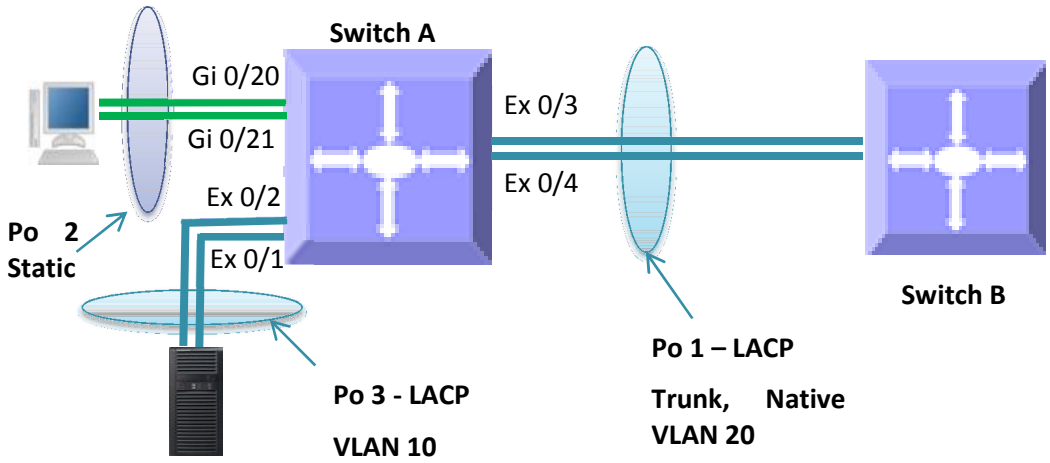
| Step | Command | Description |
|---|---|---|
| Step 1 | **configure terminal** | Enters the configuration mode. |
| Step 2 | **set port-channel enable** | Enables the link aggregation feature. |
| Step 3 | **End** | Exits the configuration mode. |
| Step 4 | **show etherchannel** | Displays link aggregation feature status |
| Step 5 | **write startup-config** | Optional step – saves this configuration to be part of startup configuration. |

# 1.13 Link Aggregation Configuration Example

Configure Switch A as shown below in Figure LA-3.

1. Aggregate ports Ex 0/3 and Ex 0/4 with LACP mode. Also configure this aggregation as a trunk interface with native VLAN 20.
2. Aggregate ports Ex 0/1 and Ex 0/2 with LACP mode. Configure this aggregation as an access port on VLAN 10.
3. Aggregate ports Gi 0/20 and Gi 0/21 statically.

**Figure LA-3: Link Aggregation Configuration Example**




SMIS# **configure terminal**

# Create all the required VLANs first
SMIS(config)# **vlan 10,20**
SMIS(config-vlan)# **exit**

# Create the port channel 1 interface
SMIS(config)# **int port-channel 1**
SMIS(config-if)# **exit**

# Add member ports to the port channel 1 interface
SMIS(config)# **int range ex 0/3-4**
SMIS(config-if)# **channel-group 1 mode active**
SMIS(config-if)# **exit**
# Configure the VLAN requirements for the port channel 1 interface
SMIS(config)# **int port-channel 1**
SMIS(config-if)# **switchport mode trunk**
SMIS(config-if)# **switchport trunk native vlan 20**
SMIS(config-if)# **exit**

# Create the port channel 2 interface
SMIS(config)# **int port-channel 2**
SMIS(config-if)# **exit**

# Add member ports to the port channel 2 interface
SMIS(config)# **int range gi 0/20-21**
SMIS(config-if)# **channel-group 2 mode on**
SMIS(config-if)# **exit**

# Create the port channel 3 interface
SMIS(config)# **int port-channel 3**
SMIS(config-if)# **exit**

# Add member ports to the port channel 3 interface
SMIS(config)# **int range ex 0/1-2**
SMIS(config-if)# **channel-group 3 mode active**
SMIS(config-if)# **exit**

# Configure the VLAN requirements for the port channel 3 interface
SMIS(config)# **int port-channel 3**
SMIS(config-if)# **switchport mode access**
SMIS(config-if)# **switchport access vlan 10**
SMIS(config-if)# **end**

# Check the running-configuration for accuracy
SMIS# **show running-config**
Building configuration...
Switch ID Hardware Version Firmware Version
0 SSE-G48-TG4 (P2-01) 1.0.13-7

ip address dhcp
interface port-channel 1
exit
interface port-channel 2
exit
interface port-channel 3
exit

vlan 1
ports gi 0/1-19 untagged
ports gi 0/22-48 untagged
ports po 2 untagged
exit
vlan 10
ports po 3 untagged
exit
vlan 20
ports po 1 untagged

```
exit

interface Gi 0/20
channel-group 2 mode on

interface Gi 0/21
channel-group 2 mode on

interface Ex 0/1
channel-group 3 mode active

interface Ex 0/2
channel-group 3 mode active

interface Ex 0/3
channel-group 1 mode active

interface Ex 0/4
channel-group 1 mode active

interface po 1
switchport trunk native vlan 20
switchport mode trunk

interface po 3
switchport access vlan 10
switchport mode access

interface vlan 1
ip address dhcp

exit

SMIS#
```

# Check the port channels using the "**show etherchannel**" command

```
SMIS# show etherchannel detail

Port-channel Module Admin Status is enabled
Port-channel Module Oper Status is enabled
Port-channel System Identifier is  00:30:48:a1:11:01
LACP System Priority: 32768

        Channel Group Listing
        ---------------------
Group: 1
----------
```

```
Protocol: LACP

            Ports in the Group
            ------------------

Port: Ex0/3
------------

Port State = Down, Not in Bundle
Channel Group: 1
Mode: Active
Pseudo port-channel = Po1
LACP port-priority  = 128
LACP Wait-time  = 2 secs
LACP Activity: Active
LACP Timeout: Long

Aggregation State: Aggregation, Defaulted

Port: Ex0/4
------------

Port State = Down, Not in Bundle
Channel Group: 1
Mode: Active
Pseudo port-channel = Po1
LACP port-priority  = 128
LACP Wait-time  = 2 secs
LACP Activity: Active
LACP Timeout: Long

Aggregation State: Aggregation, Defaulted

            LACP Port   Admin  Oper   Port    Port
Port    State   Priority    Key    Key    Number  State
-----------------------------------------------------------------------
Ex0/3   Down    128         1      1      0x33    0x45
Ex0/4   Down    128         1      1      0x34    0x45

Port-channel: Po1
------------------

Number of Ports = 2
HotStandBy port = null
Port state = Port-channel Ag-Not-Inuse
Protocol = LACP
Default Port = None
```

```
            Channel Group Listing
            ---------------------
Group: 2
----------
Protocol: Manual

            Ports in the Group
            ------------------

Port: Gi0/20
-------------

Port State = Down, Not in Bundle
Channel Group: 2
Mode: On
Pseudo port-channel = Po2
LACP port-priority  = 128
LACP Wait-time  = 2 secs
LACP Activity: Passive
LACP Timeout: Long

Aggregation State: Aggregation, Defaulted

Port: Gi0/21
-------------

Port State = Down, Not in Bundle
Channel Group: 2
Mode: On
Pseudo port-channel = Po2
LACP port-priority  = 128
LACP Wait-time  = 2 secs
LACP Activity: Passive
LACP Timeout: Long

Aggregation State: Aggregation, Defaulted

            LACP Port   Admin  Oper   Port    Port
Port    State   Priority    Key    Key    Number  State
------------------------------------------------------------------------
Gi0/20  Down    128       2     2     0x14    0x44
Gi0/21  Down    128       2     2     0x15    0x44

Port-channel: Po2
------------------

Number of Ports = 2
HotStandBy port = null
```

```
Port state = Port-channel Ag-Not-Inuse
Protocol = Manual
Default Port = None

            Channel Group Listing
            ---------------------
Group: 3
----------
Protocol: LACP

            Ports in the Group
            ------------------

Port: Ex0/1
-------------

Port State = Down, Not in Bundle
Channel Group: 3
Mode: Active
Pseudo port-channel = Po3
LACP port-priority  = 128
LACP Wait-time  = 2 secs
LACP Activity: Active
LACP Timeout: Long

Aggregation State: Aggregation, Defaulted

Port: Ex0/2
-------------

Port State = Down, Not in Bundle
Channel Group: 3
Mode: Active
Pseudo port-channel = Po3
LACP port-priority  = 128
LACP Wait-time  = 2 secs
LACP Activity: Active
LACP Timeout: Long

Aggregation State: Aggregation, Defaulted

            LACP Port   Admin  Oper   Port    Port
Port    State   Priority    Key    Key    Number  State
-----------------------------------------------------------------------
Ex0/1   Down    128       3     3     0x31    0x45
Ex0/2   Down    128       3     3     0x32    0x45

Port-channel: Po3
```

---

Number of Ports = 2
HotStandBy port = null
Port state = Port-channel Ag-Not-Inuse
Protocol = LACP
Default Port = None

SMIS#

# Save this port channel configuration.
SMIS# **write startup-config**
Building configuration, please wait. May take a few minutes . . .
[OK]
SMIS#